Challenges of small-scale commercial fisheries in Tonga

by

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Biographic Note

Simaima Sesilia Siunini Kalo Afu Tonga Bloomfield is a Tongan national who was born in Suva, Fiji in 1991. She attended pre-school and primary schools in Tonga. Simaima Bloomfield attended secondary schools in Tonga; Canberra, Australia; and Suva, Fiji. She graduated from High School in 2008 as a Commerce student and pursued a Bachelor Degree majoring in Accounting and Economics in 2009, at the University of the South Pacific, Laucala Campus, Suva, Fiji. Simaima Bloomfield graduated with a Bachelor of Economics in 2012. She continued to pursue a Postgraduate Diploma in Economics in 2013 and graduated in 2014. She continued to study for her Masters in Economics in 2015 at the University of the South Pacific when she was informed as one of the Erasmus Mundus scholarship recipients funded by the European Union (EU). In September 2015, she was enrolled in the Master in Economics at the Faculty of Economics (FEP), University of Porto, Portugal. Her research interest is Economic Development specifically focusing on the primary sectors, identifying and exploiting the opportunities, threats and challenges in this sector, and using that to help her people maximise the resources at hand.

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Abstract

Studies on fisheries have been focusing on its management and how its sustainability can be achieved with focus on whether it should be managed either by the government or communities. However, there has been little consideration on the role of (current) fisheries laws and regulations and the part it plays in achieving this. This research aims at understanding how the current fisheries laws and regulations of Tonga applies to the nation by doing a map study compared to its neighbouring island Samoa and holding it to a higher standard also by comparing it to the United Nations Convention on the law of the Sea. By doing this, the study will find out how institutions, laws and regulations amongst other factors can be enforced or newly implemented to make fishing in Tonga sustainable and successful.

JEL-codes: Q22; O13; O56.

Key words: Developing countries; Common resources; Fisheries regulation;

Resumo

Estudos sobre o setor pesqueiro focam geralmente aspetos ligados à sua gestão e sustentabilidade em diferentes enquadramentos institucionais, nomeadamente a gestão pública e a gestão comunitária. No entanto, houve poucas considerações sobre o papel das leis e regulamentos (atuais) sobre as pescas e o seu contributo para uma gestão adequada dos recursos. Esta investigação tem como objetivo compreender como as leis e regulamentos vigentes em Tonga aplicam ao país, fazendo uma análise comparativa com a ilha vizinha de Samoa e tendo também como referência a Convenção das Nações Unidas sobre as leis do Mar. Este estudo contribuirá para se saber como as instituições, leis e regulamentos, entre outros fatores, podem ser implementados para tornar a gestão dos os recursos pesqueiros em Tonga sustentáveis .

Códigos-JEL: Q22; O13; O56.

Palavras-chave: Países em desenvolvimento; Recursos comuns; Pesca.

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Chapter 1. Introduction

Fisheries have been a major direct or indirect source of income, livelihood and nutritional benefits for many of the world's population. The most recent estimate indicates that it is close to 57 million people who are engaged in fishing at the primary sector (Food and Agriculture Organization of the United Nations (FAO), 2016). In many parts of the world, communities' fish in local waters either inland or in coastal areas close to their homes. This may be known as the small-scale fisheries that usually operate from small boats and the shores. Small-scale fisheries rely on local resources, are labour intensive and have lowered overhead capital wise (Villasante *et al.*, 2015).

South Pacific societies currently undergo transition from reciprocity and direct sustenance systems to cash based economies (Kronen, 2004). The two major sources of livelihoods in the Small Island Developing States (SIDS) of the Pacific are the land and the ocean. However, the growing populations and the scarcity of land among others have impelled people, to embrace fishing as their major income generator (Kronen, 2004). Fishing has always been at the heart of the Pacific people. Coastal fisheries historically determined the livelihoods of Tongan people (Kirch and Dye, 1979). The low levels of employment and employment opportunities have pushed people to seek for alternatives.

Small scale commercial fishing is restricted to nearby coastal areas which involves little entrepreneurial skill, small informal groups, small fishing vessels, low capital investment, and correspondingly low productivity (Veitayaki, 1993; Tu'avao *et al.*, 1994; Passfield, 2001). Government policies and projects continued to focus on improving and fostering commercial coastal fishing such as subsidizing loans for boat and fishing equipment, installation of ice plants and market outlets (Kronen, 2004). However, these attempts have failed to sustain the small-scale commercial fishermen's livelihoods and economy, which highly questions the efficiency and effectiveness of such interactions.

While small-scale fishing especially at the village level has been recognized as central for social, economic, cultural, and food security reasons (Zeller *et al.*, 2006), its contribution to the Gross Domestic Product (GDP) has been overlooked to focus mainly

on the large-scale commercial fisheries (Christy, 1986). Pauly (1997) states that small-scale fisheries are commonly characterized as ‘‘the occupation of last resort’’ and fisherfolks are ‘‘the poorest of the poor’’ (Pauly, 1997: 42).

In addition, fishing is a common good. The concept of common goods or common resources has taken up relevant positions in the past in relation to political, economic and social philosophy. Having different meanings over time in its various contexts, common goods are simply known in the study field of economics as goods that are non-excludable, i.e. they are available to anyone, however rival: its usage by a single person can decrease or prevent another from using it (Argandoña, 2011). A usual example of this type of good would be the trees in the forest, the fish in the ocean/lake or a communal pastoral land similar to Hardin's example in his 1968 work, "The Tragedy of the Commons" (Hardin, 1968). Fisheries are unusual because of their common property nature however not unique and the problems that it faces are similar to other common property resource industries like hunting and trapping (Gordon, 1954).

Over the years, studies have found that fisheries have been exploited and even in some areas, overexploited (Basurto & Coleman, 2010). The consequences of overexploitation have therefore been faced by many of the fishing communities in various parts of the world (Basurto & Coleman, 2010), which threatens the very core of their livelihoods. In search for a solution, it has been realized that the question does not lie in the ecology of life in the sea but rather in the way man uses these resources for his own benefits or own economic purposes (Gordon, 1954). Despite this, there are some cases where the avoidance of over exploiting these resources have been seen and well documented (Ostrom, 1990).

A possible way forward is to study and understand how small communities are able to collectively act towards avoiding overexploitation (Basurto & Coleman, 2010). According to Burkenroad (1951) and Gordon (1954), fishery management is intended to benefit man and not fish, and there have been various studies regarding the need of implementing regulations or policies to govern how much fish to catch and in some cases, where to catch the fish as well.

This research focuses on the livelihoods of the poor and grassroots' small-scale

commercial fishing that are often overlooked by the national development programs, yet they collectively form the foundation of societies and contribute significantly to the livelihoods of the Tongans. It is in the belief that there is a great need for an understanding of the small-scale commercial fishermen's experiences and needs for efficient and effective channel of aid and financial support which are rarely received. Particularly, we need to understand how fisheries regulation influences small-scale commercial fishermen's livelihoods.

This study analyses Tonga's current fisheries laws and regulations; identifies loopholes and make suggestions on how improvements can be made; and how the current regulations can be enforced. Suggestions are also made to implement new regulations to assist the economic development of fishermen to enable them to generate money into for subsistence and for the national economy.

The dissertation is structured as follows. Chapter 2 examines what a common good is and why fisheries are a common. It continues to explore the Tongan economy in Chapter 3; statistics about the island; and also surrounding islands such as Vanuatu, Tuvalu, Kiribati, Fiji, Federal States of Micronesia, Samoa, Palau, Marshall Islands and Nauru. This is to compare the characteristics of each economy with that of Tonga's. In Chapter 4, comparisons will be done between Tonga and Samoa's fishing law and regulations with reference to the United Nations Convention on the Law of the Sea. Upon these comparisons, analyses and discussion would be carried out on what should (or not) be implemented in Tonga's fishing law and regulations. To conclude, Chapter 5 will state the recommendations from the study on how to move forward regarding the fisheries regulation that the Tongan government can take on.

Chapter 2. Fisheries and the Common Goods

2.1 Common goods

Commons, or goods used and managed in common, can be traced way back into the past yet very present in the meantime with its definition stretched to match current studies (Hardin, 1968; Aristotle, 1999; Gordon, 1954; Dales, 1968; Ostrom, 1990). The historical notion of the commons was limited to a specific section or that of a territorial type. This meant land that was used in common to farm on and provided pastoral grounds for the cattle of the community. In addition, it provided in every way it can for the livelihood of the community as a whole. At these times in terms of management, users would manage it themselves, their elected representatives or a local authority. Amongst historians, commons was limited to land (De Moor, 2012). In contemporary research, however, common goods are those goods, which are not excludable to anyone, and the consumption by one person decreases that which is available for the next (Argandoña, 2011). Examples of common goods would be forests, water resources or a fishery, which is the main focus of this research.

According to Hardin (1968: 1243), "*A finite world can support only a finite population*." In his work titled "The Tragedy of the Commons", he gives an example of an open pasture whereby cattle herders leave their cattle to graze. For centuries, tribal wars and diseases could keep the number of both man and cattle below the carrying capacity of the land. However, as time passes, social stability becomes the priority goal and every man wants to add another cattle to the herd to make profit. The commonly accessed and limited resource is the pasture, which is overgrazed with every additional cattle, and this is the tragedy of the commons. Therefore, the individual action leads to a solution - Nash equilibrium – characterized by an overutilization of the common resource, compared to the social optimum (Gibbons, 1992). Hardin (1968) concludes that the only way to tackle this problem is to educate people the necessity to abandon the freedom to breed in order to overcome the scarcity of resources in the long run.

The idea behind a common good is something similar to what Hardin (1968) mentions in his work of "The tragedy of the Commons". Fishing grounds or fisheries is a common good resource. At one point in time the stock of fish is more than enough and

is sustained over a period of time. However, due to various reasons, it could become like the over-grazed pasture and becomes overexploited and overfished.

Although Hardin popularized the tragedy of the commons dilemma, the Greek Philosopher Aristotle once said that what is common to a large number of people would be given the less amount of care because it is human nature to be rational and act in certain ways that promotes one's self interest (Ostrom, 1990). People's' true nature is also pointed out by Thomas Hobbes, an English Philosopher (Wolfenden, 2010). He says that people are always in a state of war because they follow an anarchic system. When a person's interest is in conflict with another, they would be engaged in a war where arguments would take place and in some cases could lead to violence just to acquire what they wish for (Wolfenden, 2010). Gordon (1954) also agrees in his "Theory of a Common-Property Resource" Study that everybody's property is nobody's property (Gordon, 1954). No one at all would value this common property that is accessible to everyone. A clear example is mentioned by Ostrom (1990) who states that the fish in the sea is worthless to a fisherman since there is no total assurance or guaranteed that it will be there the next day if they are not fished today and left behind (Ostrom, 1990).

A large number of the world's population is dependent on resources that are subject to some form of a tragedy of the commons. The conventional wisdom is that such problem can only be solved by privatizing resources as such (Cudney-Bueno and Basurto, 2009; Feeny *et al.*, 1990, Hardin, 1968;). Others call for the need of a government body to manage it (Alcala & Vande Vusse, 1994; Cudney-Bueno and Basurto, 2009; Hardin, 1968). Hardin argued that there are no technical solutions; therefore, this is what should be done – a form of management carried out either by the government or private agents.

The privatisation of common resources would usually provide an incentive for rationale exploitation. If the owner's property rights are tradable, that specific individual will experience the cost and benefits and this will therefore be reflected in the market price of the resource (Feeny *et al.*, 1990). However, this does not necessarily mean that sustainable use will be consistent. Suppose a redwood planted for $1 would be worth $14,000 at maturity date, which may take 2000 years. The rate of return implied will be less than 0.5 percent - a rate of return well below that which is generally available to

investors. It would make ecological sense to plant redwood but not economically under a privatised regime (Feeny *et al.*, 1990). It has been found that relatively slow-growing and late-maturing species such as whales may be economically optimal to deplete rather than to use sustainably (Feeny *et al.*, 1990). The Antarctic blue whale with a maximum sustainable yield level of probably no more than 5% a human-rate of time preference (discount rate) of greater than this 5% would be enough to lead to its extinction, even under exclusive and enforceable private-property rights. According to Feeny *et al.* (1990), these rights permit the owner to maximize the present value of the resource, yet the resource is not protected from extinction (Feeny *et al.*, 1990).

However, in recent years, studies have shown that there are numerous ways in which these resources can be managed (and tragedy of the commons will not be present) without the need for privatization or to be controlled by the government (Ostrom, 1990). Communities that are dependent on common property resources have formed institutional arrangements in which the resources are managed with different degrees of success in attaining sustainability (Berkes *et al.*, 1989).

In many instances, a community or local-based management system is concluded as successful. This is not because it reflects conservation and sustainability but because the system has survived long periods through various crises. These long enduring successful institutions have earned itself special attention for theory building regarding community-based management (Ostrom, 1990). The majority of these community based management institutions have historical roots, as in the Japanese iriai (the village common lands/forests), its coastal fisheries, the Swiss Alpine commons and some coastal resources in a few Pacific island states (Ruddle and Akimichi, 1984).

2.2 Fisheries as a common good

There have been numerous studies regarding fisheries in various disciplines, from biology to economics (Berkes *et al.,* 1989; Gordon, 1954; Ostrom, 1990; Ruddle and Akimichi, 1984). Scholars in the field of biology study the effects of fishing on the fish stocks in the ocean or rivers while on the other hand economists study the economic activity that takes place within fishing whether it is its contribution to the total output of the economy or as the principal means of income. At the same time, both groups are

working to find an effective way of managing these resources to avoid overfishing which leads to the problem of fisheries depletion and overexploitation. One can therefore say that what biologists study regarding fisheries sustainability can be translated into regulative policies to conserve nature and help manage these resource. Burkenroad (1951) (*apud* Gordon 1954) however says that the management of these resources is intended to satisfy the benefit of man and not necessarily that of the fish. Therefore, if an effective way of managing fish stocks was found, it cannot be considered as beneficial per se as it is only there for men to benefit from (Gordon, 1954).

The marine stocks that have been fished within the biologically sustainable level have decreased from 90 percent in 1974 to 71.2 percent in the year 2011 (Food and Agricultural Organisation (FAO), 2014). This decrease alarms for efficient and effective management of the stock. However managing fisheries or marine resources is very unique due to its migratory nature; that is, it can migrate from one place to another. This causes various problems compared to managing a stationary resource.

Communities that develop shared values and consensus rules on fisheries can monitor one another's resources and impose sanctions (Berkes, 2004). Most governments would count marine resources as open to all citizens and license holder, yet ignoring the fishing territories of a number of maritime communities who depend on these stocks. The national or government policies put into place, may prevent success or development in local management (Berkes, 2004).

Table 1 shows a synthesis of main literature on the fisheries and common goods. As we can see, Alcala and Vande Vusse (1994) have observed in their fishery management study in the Philippines that it is common for government agencies to take interest in the protection and conservation of natural resources. Laws, rules and regulations are put forward by these agencies and are taken by some as a resource management technique. However, on the other hand, the government does not have the personnel and equipment to ensure that these regulation and policies are being enforced. In reality, the government must depend on the fisher folk who use the coastal resource to make proper management decisions on a daily basis (Alcala & Vande Vusse, 1994).

In a similar study, Basurto and Coleman (2010) compared two fishing communities in Mexico and found out the importance of collective action amongst users of the common resource. One of these communities successfully engaged in collective action to limit harvesting efforts. This enabled them to maintain a sustainable harvest. However, the same did not take place for the other community and that led to fishery overexploitation. The small difference in the carrying capacity can give communities the ability to create or sustain successful action overtime (Basurto & Coleman, 2010).

Furthermore Hanna and Smith (1993) in their study in Oregon, United States discovered that the input from fishermen affected the regulatory policies. According to the study, poor communication between the Oregon vessel captains, biologists and managers was a vital hindrance in the ability to create new institutional arrangements (Al-Fattal, 2009).

At a time before powerful governments where laws and regulations were put into place to govern a nation, common fisheries were conditional on formal and informal property rights systems and regulations. The community or the traditional hunting and gathering groups would define and implement exclusive harvesting zones. In addition, their norms and customs served some forms of regulation to manage resource use particularly controlling and minimising exploitation and to use resources sustainably (Al-Fattal, 2009). For instance, in the 19th century, the fisheries market in California operated under informal regulation schemes, which was maintained and enforced by ethnic producers' coalitions. Fishermen of a specific ethnicity would claim a familiar stock, exclude fishermen of other ethnics and then regulate the harvest and the sales of the fish through market cooperatives (McEvoy, 1988).

Upon extensive studies on the evolution and effectiveness of community based management effort to establish, monitor and enforce a marine reserve in the Gulf of Mexico, Cudney-Bueno and Basurto (2009) conclude that the locally established harvesting rules leads to a swift increase in the resource abundance. However, on the other hand, the news on the resource abundance spreads quickly and can attract outsiders to poaching and can eventually lead to overfishing. This unsustainable fishing needs a higher level of governance where the government plays a key role in supporting the local management (Cudney-Bueno and Basurto, 2009).

Similarly, Ostrom (1990) claims that fisheries that are scattered over an area or region has many user groups or small communities. These user groups operate mainly by social sanctions and require various management practices according to the different users. However, local management system acting on its own would more likely to be ineffective (Berkes, 2004), therefore regional management can get assistance from the government regarding harvest quotas and how it can be enforced.

The conditions of free access and competition in the market lead to non-optimal solutions in the use of the common property resources. The open access nature of natural resources and the presence of externalities in the use lead to market equilibrium solutions that implicate an overexploitation of the resources. Gordon (1954) proposed that the only way to take care of this overexploitation is to either make these resources private or government property which will be subject to one directing power.

Supporting the evolution of private property rights, Thomson *et al.* (1986) states that the cost of organizing collective management are extremely high and its effectiveness is problematic (Gordon, 1954). Privatization does, however, risk inequality at the subdivision stage when control over the resource itself is allotted to particular individuals. Therefore they believe that the management of the resources evolve over time and could either be made of collective management at the community level; privatization; or taken over by the government (Thomson *et al.*, 1986). In the Atlantic Fishery case, community based fisheries management can be difficult as a given fishery stock can be used by both offshore and coastal fisheries, by big and small-scale operations. In addition, in some cases, there is more than one national jurisdiction so that is particularly a problem. McWhinnine (2006) asserts that the probability of the fish stock being over utilised or depleted increases as the number of countries that share the fish stocks increases. He suggests that a negative effect on the fish stocks could come simply from having access to both big and small portions of a country's waters. As a migratory resource, the effort to protect fisheries is a bit more complicated than other usual common pool resources. It constitutes problems related to cooperation and enforcement, which cannot be solved at local or regional levels. Therefore, this is usually overcome via bilateral and multilateral international agreements that also require voluntary cooperation among governments (Berkes, 2004).

Table 1 - Synthesis of main literature on fishering and common goods

Type	Authors	Title	Goal/ Research question	Methodology	Territorial unit	Period	Conclusions
Empirical Quantitative	McWhinnie (2006)	The Tragedy of the Commons in International Fisheries: An Empirical Examination	Are shared fish stocks systematically more exploited?	A Cournot-Nash solution was used to analyse the interaction of multiple players and to define the equilibrium fish stock levels.	Japan, North and South Korea, America, Canada, Russia, South Pacific.	Late 1990s to the 2000s	Profit of fishing depends on the price of fish, technical capability, effort level, stock size and average cost of effort. The fish stock grows dependent on the logistic natural growth function, with an intrinsic growth rate, natural maximum stock size, and stock size, less the amount of harvesting done by all players. History matters and that the conjunction of social and environmental events contributes profoundly to the production of trap processes.
Empirical Quantitative	Cudney-Bueno and Basurto (2009)	Lack of Cross-Scale Linkages Reduces Robustness of Community-Based Fisheries Management	How can state or privatisation and community-based work together to overcome the overexploitation of fisheries?	Analysis of Variance Model (ANOVA) was used to find the improvement in the fisheries reserve when rule compliance was high due to social pressure and not heavy policing by external officials. Data collected from the interviews and fishing trips were also used to graphically represent the fishery stock during the sampling and monitored period (mass, length and density)	Gulf of California, Mexico	1997-2001, 2002 and 2003-2004.	Locally crafted and enforced harvesting rules led to a rapid increase in resource abundance. Presence of researchers and a NGO played an important role in facilitating the establishment of reserves.

Type	Authors	Title	Goal/ Research question	Methodology	Territorial unit	Period	Conclusions
Empirical Quantitative	Zeller *et al.* (2006)	Fisheries Contributions to GDP: Underestimating Small-scale Fisheries in the Pacific.	What is the true contribution of small-scale fisheries to the GDP?	Statistical Data on average prices and fish catch (both reported and unreported) to calculate the contribution of small scale fisheries to GDP	American Samoan and Northern Marianas	1982-2002	Contributions of small- scale fisheries to GDP may have been underestimated and indicate that the non-commercial sector plays a more significant role in national accounts as contributors to GDP than currently assumed.
Empirical Qualitative	Tu'avao *et al.* (1994)	The Present Situation of Fisheries in the Tongatapu Island Group	What is the current status of fisheries activities in Tonga according to statistics information gathered?	Statistical Data was collected via observation and interviews	Tongatapu, Tonga	1991	There are fluctuations in the catch of fishermen and only some are able to take it to the main market. However, better information can be gathered when Statistics Program is improved in the future
Empirical Qualitative	Al-Fattal (2009)	The Tragedy of the Commons: Institutions and Fisheries Management at the Local and EU Levels	Is the functioning of the tragedy of the commons approach at both international and local level affect the policy outcomes imposed on these different areas?	Literature Review; Using previous studies for arguments and to draw conclusions regarding the tragedy of the commons approach in local and international levels	California, Oregon, and European Union Fisheries	1993	At the local level the tragedy of the commons can be mitigated when a co-management of institutions is achieved, while the EU case shows that the tragedy of the commons is a realistic prediction when dealing with international institutions.

Type	Authors	Title	Goal/ Research question	Methodology	Territorial unit	Period	Conclusions
Empirical Qualitative	Thomson *et al.* (1986)	Institutional Dynamics: The Evolution and Dissolution of Common Property Resource Management	What factors explain and make understood the dynamics of institutional arrangements in managing common pool resources?	A framework that was adapted from a previous study was used to analyse (iteratively) the case of Niger and Thailand to see the dynamic sequence of change in institutional arrangements.	Niger and Thailand	1884 – 1984, 1850-1980	A peasant farmer had little access and influence in the political system but was the opposite for landowners. Transaction cost is high when collective management is considered however; various trends affect the type of management structure. At the same time, management enterprise is personally worthwhile.
Empirical Qualitative and Quantitative	Veitayaki (1990)	Village-Level Fishing in Fiji: A Case Study of Qoma Island	How has fisheries development evolved over the years and what are the roles played by small fisher folks in the development of rural areas?	An analysis of information gathered via both primary findings and studying of literature.	Qoma Island, Fiji	1990	The catch can be increased significantly with the employment of better and modern fishing methods and equipment, more regular effort, and better storage and marketing facilities. Only with cooperation between policy makers and villagers will make it be possible for contemporary and future islanders to maintain a healthy, productive and sustainable marine resource base while maintaining their cultural resilience which is still intimately tied to its fisheries resource.

Type	Authors	Title	Goal/ Research question	Methodology	Territorial unit	Period	Conclusions
Theoretical_Qualitative_Case Studies	Berkes (2004)	From Community-Based Resource Management to Complex Systems: The Scale Issue and Marine Commons	Is cross scale institutions (co-management) the solution when dealing with complex adaptive systems such as community based-resource management?	With the various studies, analysis was done and it was stated that Building theory for commons and community-based management requires an understanding of commons as complex systems, with attention to scale, self-organization, uncertainty, resilience and other characteristics of complex adaptive systems. As the examples in this paper indicate, cross-scale issues in commons management are pervasive.	Cambodia, Kerala (India), Sri Lanka, Atlantic Ocean, Gouyave	Late 1990's to the 2000's	Community-based resource management (CBRM) is vulnerable to external drivers. In particular, CBRM is insufficient and incapable of dealing with problems such as migratory marine resources. Hence, it is important for commons theory to look beyond local-level, community-based resource management. We need to elaborate a commons theory that provides insights into the solution of regional and global as well as local commons problems. In this sense, community-based management can be considered as a shorthand for governance that starts from the ground up but deals with cross-scale relations.
Theoretical_Qualitative_ Case Studies	Feeny *et al.* (1990)	The Tragedy of the Commons: Twenty-Two Years Later	Other than private, state and communal property, how can institutional arrangements and cultural factors be incorporated for better analysis and prediction of	Past studies suggest that Hardin's model was insightful but incomplete. It overlooks the important role of institutional arrangements and cultural factors	Asia, Africa, Canada	1968-1989	A more comprehensive theory can be developed to be able to account for sustainable resource management under communal-property regime under a common property resource.

Type	Authors	Title	Goal/ Research question	Methodology	Territorial unit	Period	Conclusions
Theoretical Quantitative	Basurto and Coleman (2010)	Institutional and ecological interplay for successful self-governance of community-based fisheries	What is the role of institutional arrangements and ecological factors that facilitate the emergence and sustainability of successful collective action in small-scale fishing social–ecological systems?	A modified logistic growth function to stimulate how ecological factors affect small scale fishing communities with varying degrees of institutional development in their ability to avoid overexploitation	Mexico; Seri and Kino Viejo	2005, 2008-2009	Strong and timely institutions are necessary but not sufficient to maintain sustainable harvests over time. The sooner communities adopt institutions, and the stronger the institutions they adopt, the more likely they are to sustain the resource stock. Exactly how timely the institutions must be adopted, and by what amount harvesting effort must be diminished, depends on the ecological carrying capacity of the species at the particular location.
Theoretical_Qualitative	Alcala and Vande Vusse (1994)	The Role of Government in Coastal Resources Management	What is the best approach in managing fisheries and what the role of the government in it is?	No particular model was used however a review of how the involvement of the government has evolved in the fisheries industry.	Philippines	1975- mid 1990s	The government should play a more effective role in managing coastal resources, both at national and local levels. Government can do this via supporting the development of effective management regimes for resource users.
Theoretical_Qualitative	De Moor (2012)	What Do We Have in Common? A Comparative Framework for Old and New Literature on the Commons	What do we have in Common?	Literature review.	England, Wales, Holland, German, USA.	1280-1989	Governing resources collectively is the current trend that comes from self-governance. However, in which form of governing is more efficient & effective; that of state or collective action.

Type	Authors	Title	Goal/ Research question	Methodology	Territorial unit	Period	Conclusions
Theoretical_Qualitative (+ Quantitative)	Gordon (1954)	The Economic Theory of a Common-Property Resource: The Fishery	How does the economic theory of natural resource utilisation work for a fishing the fishing industry?	A total cost and production function was derived to express a simple maximization solution of fishing effort.	European Waters, Atlantic Coast, Australia	1915-1949	In an open access and competition market, there will be an inefficient solution in the usage of resources. In an unregulated common property nature of fishery, the industry is bound to expand to both, a point of economic, even biological, overfishing.
Theoretical_ Qualitative	Hardin (1968)	The Tragedy of the Commons	What is a common resource and how is it best utilized?	A qualitative study with arguments based on theories	The World	1968	Where a “commons” exist, over exploitation and degradation is bound to take place.

Chapter 3. Main statistical characteristics of Tonga in the South Pacific and Fisheries

In the East Asia and Pacific (ESP) Region, there are a total of 13 Small States. This includes Vanuatu, Tuvalu, Kiribati, Fiji, Federal States of Micronesia, Samoa, Palau, Timor Leste, Marshall Islands, Brunei Darusallam, Nauru and Tonga (World Bank, 2016). Of these 13 Small States, 11 are located in the Pacific. Pacific Islands belong to either the Polynesian, Melanesian or the Micronesian group of islands. According to the World Bank (2016), Tonga meets its definition of a Small State. It has a population less than 1.5 million and is also a member of the Small States Forum. Small States are identified via certain characteristics such as a small population and land area, limited human capital and technology, labor markets and capacity constraints, the growing exposure to climate change and market shocks and not forgetting climate change (World Bank, 2016).

As a consequence of being small in size, Small States are highly exposed to trade volatility. This is especially because most Small States have highly concentrated export sectors with limited exports and only have a few trading partners. The World Bank (2016) highlights that Small States are more vulnerable to risks and market shocks due to continuous shifts in the terms of trade and non diversified market risks. Most of the Small States are dependent on remittances and/or tourism as a source of revenue. In most Pacific Island Countries (PICs), remittances remain as one of the main sources of income. It is a life line for most and while it needs careful management, both these revenue collectors depend on how well the global economy is doing, as the shifts in global macroeconomics affects the flow of tourists and migrants.

Heavily relying on remittances, more than one-third of Tonga's total GDP in the year 2002 and 2007 was composed of it. However, from 2009-2012 it decreased making up almost just one quarter of the GDP. In the year 2009 during the global economic crisis, there was a decrease in the inflow of remittances from the expatriates overseas and this was clearly reflected in the contraction of the economy during this period (United Nations Development Program (UNDP), 2017). Personal remittance as a whole for Pacific Island Small States can be seen to have decreased by 1 percent from 2007 –

2008 but in spite of that, it rose again in 2009. In terms of tourism, Pacific Island Small States have been experiencing an increased tourist arrivals with over 1 million in 2015 alone. In the early 2000s the number of arrivals for international tourism to Pacific Island Small States was 572454.1063 however as seen on Table 2, there was a big jump in 2007 to almost 1 million. In 2008, it went very close to a million and then there was a slight decrease in 2009. These fluctuations could have been caused by the changes in the global economy as a whole.

Table 2 – Tourism and Personal Remittances of Pacific Island Small States, 1990-2015.

Years	International tourism, number of arrivals	Personal remittances, received (% of GDP)
1990		5,762
2000	572 454,106	3,989
2007	923 978,258	7,308
2008	982 543,089	6,341
2009	962 452,238	7,774
2010	106 4312,855	7,512
2011	1 121 471,327	6,656
2012	1 140 557,636	7,439
2013	1 123 511,807	7,311
2014	1 184 937,311	6,872
2015	1 259 265,836	7,272

Source: World Bank, 2016

The World Bank (2016), reports that not only are the Pacific Island Countries small in size but they are also very remote, located far away from major markets of the world. Its geographical location makes it hard to access main shipping routes thus only making it possible for very little shipping lines to carry out trading transactions in its ports. With low volumes of exports and imports to PICs, the cost of trade is high. Being the farthest from the centre of where most economic activities take place, imported goods become

more expensive for PICs. Given this feature, PIC firms are not fully able to integrate into the global value chains. It is a challenge for such small sized and remote islands to access global markets and therefore makes it hard for them to be in competition with other players in the market (World Bank, 2016).

Not only is the location of PIC Small States a disadvantage to trade but it also poses a threat to natural disasters and first hand experience of climate change. This stands to threaten the physical and the economic viability of the PICs. According to the World Bank (2012; 2016), the intensity of natural disasters have a significant effect on finances and other assets. For instance, Vanuatu's average annual loss from disasters relative to GDP is approximately 6.5 percent and they are in second place after Grenada, another Small State. Following Vanuatu with close to 6 percent is Niue and then Tonga with about 4.5 percent. This shows that climate change does impose economic cost however also physical and social costs. It is even worst for those that live in marginal conditions or exposed lands such as the outer island population of Kiribati migrating to Tarawa, its capital (World Bank, 2016). When such happens, PICs have only a limited financial capacity to respond to disaster and therefore relying again on donors from overseas countries which leads us to the next subject.

The World Bank reports that the PICs are experiencing an increasing budget and trade deficit (World Bank, 2012). This is a result of the heavy reliance on remittances and aid (For example, in the year 2013, Samoa's GDP was 23 percent remittances). After the global financial crisis in 2008, the inward flow of remittances and aid was negatively affected. The countries' abilitiy to sustain the level of income and service delivery was heading in a downward spiral. Even if these inflows were not affected at all, the lack of financial and human capital resources available would still not be able to adequately provide public and social services needed by the population. The absolute size of the public sector is still very small to do so and make the economy thrive (World Bank, 2016).

However, although PICs have characteristics that places them on the disadvantaged end of the scale compared to other countries in the world, there are also some advantages to it. Being surrounded by water and very remote, the fishing and the agricultural way of life allows people to meet their everyday needs via subsistence farming or fishing

however at the same time creating a niche market for cash crops, import substitution and small-scale local trade (World Bank, 2016). This is a possible gain for the PICs and can generate additional income. Although it cost to maintain certain number of neglected agricultural sectors, expanding potential schemes such as the long-line tuna fishing and developing market based structures can actually increase the current account revenue for PICs and reinforce the management of fish stocks (World Bank, 2016).

Table 3 presents statistics on the surface area, population and GDP per capita of the PICs. New Zealand and Australia is included for comparison purposes as they remain as Tonga's main exporters. Solomon Islands has the most surface area (excluding Australia and New Zealand which are not PICs) and Nauru and the Marshall Islands ranking at last with just 20 sq. kms. Fiji is the most populated although it has a smaller surface area compared to the Solomon Islands. Some of the lesser populated islands are Tonga, Samoa and Tuvalu with more or less similar GDP per capita ranging from $3600 to $3700.

Table 3 - PICs Surface Area, Population and GDP per Capita

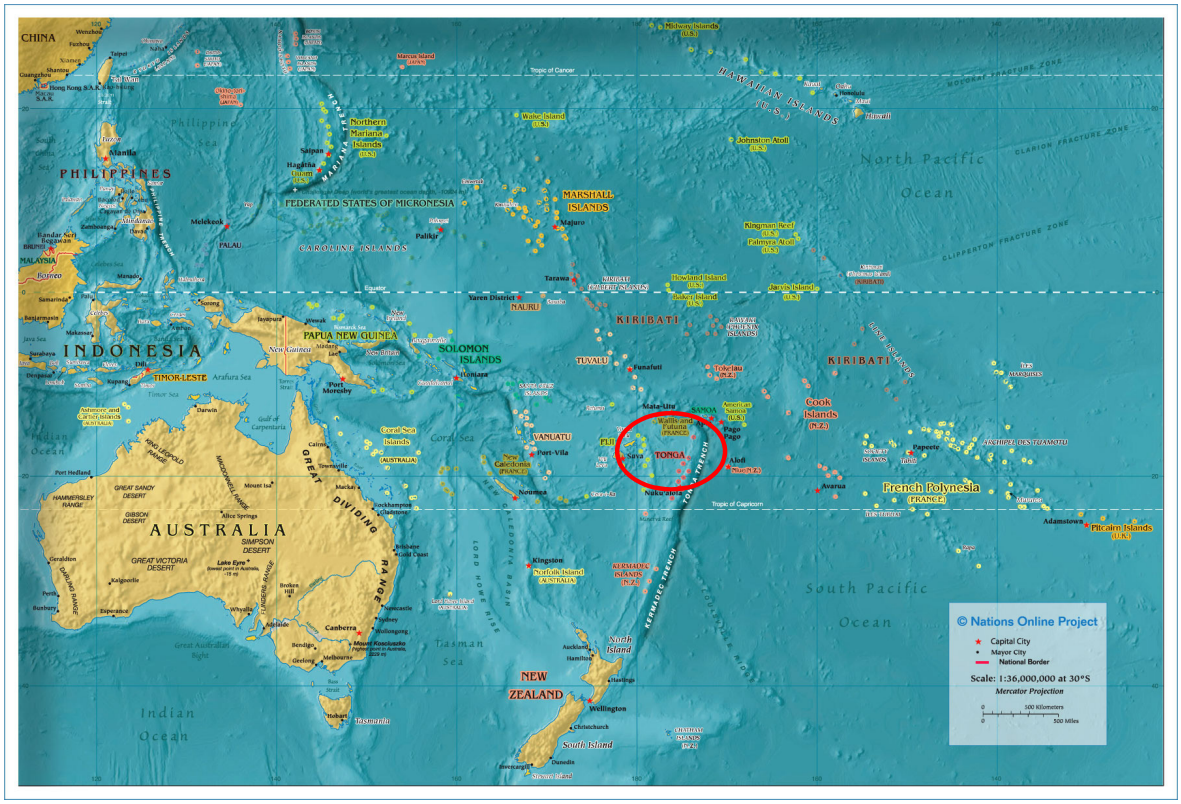
Pacific Island Countries (Including Australia and New Zealand)	Surface Area (sq. km)	Population, 2015	GDP per Capita (Constant 2010), 2015
Australia	7 741 220	23 789 752	54 688,446
Federated States of Micronesia	700	104 460	2 793,358
Fiji	18 270	892 145	4 349,524
Kiribati	810	112 423	1 615,576
Marshall Islands	20	52 993	3 344,566
Nauru	20	12 475	9 143,666
New Zealand	267 710	4 595 700	36 801,396
Palau	460	21 291	10 410,088
Samoa	2 840	193 228	3 641,009
Solomon Islands	28 900	583 591	1 475,360
Tonga	750	106 170	3 700,243
Tuvalu	30	9 916	3 706,314
Vanuatu	12 190	264 652	2 823,185

Source: World Bank, 2016

Drawing on Table 3, this study will conduct a mapping study of Tonga and Samoa's fisheries policies and regulations based on the similarity between both countries when considering population and GDP per capita.

The capital of Tonga is Nuku'alofa and the local currency is the Tongan Pa'anga (TOP). Tonga is the only country to have a Constitutional Monarchy in the South Pacific and has never been colonized by any foreign power making it an unique political system in the region (Kaitani and McMurray, 2006). The mother-tongue is Tongan and English is the second. The country for the most part is rural with only twenty-five percent of the population living in the urban areas. Tonga's economy is still very much agricultural based and it has a limited export base (UNDP, 2017).

Figure 1 – Location of Tonga in the Pacific



Source: Nations Online Project [1]

Located on the northeast of Tonga is the Independent State of Samoa or more commonly known as Samoa (see Figure 1). The island gained independence from New Zealand in the year 1962 making it the first island in the South Pacific Region to gain independence at the time (UNDP, 2017). Fast-forwarding into the future, Samoa has

[1] http://www.nationsonline.org/oneworld/map/oceania_map.htm

established itself as a self-governing democratic country headed by the Prime Minister. Together with Tonga, Samoa also belongs to the Polynesian Island group of the Oceania Region. Its capital is Apia. The people of Samoa speak Samoan and English is the second language. The island state uses its local currency of Samoan Tala (SAT) (World Bank, 2016).

Table 4 displays each PICs' structure of output. For Tonga, the Services sector has done well for itself with 56 percent of GDP in 2000 and rising to 61 percent in 2015. Therefore, it is evident that the Services sector has improved a great amount over the years compared to the other sectors. Following the Services sector is the Agriculture sector despite its decrease in contribution to GDP in 2015 compared to that of 2000. Behind the Agriculture sector is the Industrial sector; its contribution over the years has also decreased and so as Manufacturing with the least contribution to the island's economy.

Table 4 – Structure of Output: Tonga amongst other PICs

	GDP		Agriculture[2]		Fisheries	Industry		Manufacturing		Services	
	$ billions		% of GDP		% of GDP	% of GDP		% of GDP		% of GDP	
	2000	2015	2000	2015	2014	2000	2015	2000	2015	2000	2015
Australia	415.0	1,339.1	3	3	-	27	26	13	7	70	72
Tonga	0.2	0.4	23	20	2.3	21	20	10	7	56	61
Fiji	1.7	4.4	17	11	1.8	22	18	14	13	61	71
New Zealand	52.6	173.8	8	..	-	25	..	17	..	66	..
FSM	0.2	0.3	26	28	10	9	7	2	0	65	65
Kiribati	0.1	0.2	22	23	8.6	12	7	5	5	66	70
Samoa	0.3	0.8	..	..	3	..	..	..	..	..	..
Palau	0.1	0.3	5	3	2.2	18	9	3	1	78	88
Solomon Islands	0.4	1.1	35	..	2.5	13	..	8	..	53	..
Tuvalu	0.0	0.0	20	22	9.4	8	10	1	..	72	69

[2] Agriculture is defined here as everything that includes forestry, hunting, fishing plus crop cultivation and the production of livestock.

	GDP		Agriculture[2]		Fisheries	Industry		Manufacturing		Services	
Marshall Islands	0.1	0.2	..	15	14.1	..	11	..	1	..	74
Vanuatu	0.3	0.7	26	28	0.6	13	9	5	4	61	63

Source: The World Bank (2016)

Moreover, the economic role of the fisheries sector alone in the national economy is seen to be increasingly relatively important generating a lot of foreign exchange and also contributing to Tonga's GDP. In 1993, the exports of fish came second in place to squash earning second largest foreign exchange earner to Tonga exceeding vanilla which was leading in the years before (Rohorua, 2004). The fishing contribution alone to Tonga's GDP is as shown on the Table 5 below however, only from the year 2000 to 2006. One can see that the export component of total fishing is the second largest of which the local market takes the most and lastly, the non-market component. It is therefore clear that most of the fishing is sold only in the local market.

Table 5 – The Official Contribution of Fishing To Tonga's GDP (TOP$'000)

Item	2001	2002	2003	2004	2005	2006
Local Market Component	6 615	7 874	9 120	8 842	10 575	11 645
Non market component[3]	2 520	3 000	3 474	3 368	4 029	4 436
Export Component	5 243	6 675	7 488	6 174	6 827	4 067
TOTAL FISHING	14 378	17 548	20 082	18 384	21 430	20 148
Total Tonga GDP	288 395	327 036	366 549	391 388	418 696	478 226
Fishing share of Tonga GDP (%)	5.0	5.4	5.5	4.7	5.1	4.2

Source: Gillett (2009)

In terms of employment, 2300 fishermen have been registered and approximately 16% of the households in Tonga engage in some kind of commercial fishing. This number had increased over the years from the late 90s to the early 2000s, to more than 5000 households (32.6%) at the end of 2000 (Rohorua, 2004). This shows how in over the

[3] Non market component refers to the part of the fish catch that was used for subsistence needs and not sold for money.

years, fishing has provided employment for the local people.

Chapter 4. Fisheries Policies and Regulations in Tonga

In order to understand the role of institutional arrangements on the sustainability of small-scale fishing social-ecological systems, this study will map and compare the different fisheries policies and regulations of Tonga to Samoa. According to the World Bank's list of 13 Small States, 11 of them are located in the Pacific. PICs belong to either the Melanesian, Micronesian or Polynesian island groups. Samoa, Tuvalu and Tonga all belong to the Polynesian group of islands but according to Table 3, Samoa has more common characteristics with Tonga in terms of land area, population and GDP per capita (World Bank, 2016). The United Nations Convention on the Law of the Sea [4]is used as a reference to see what the loopholes are in the fisheries' policy and regulations in Tonga; what needs to be improved, enforced or implemented in the current policies and regulations that are currently used today to improve sustainability and therefore also be reflected in economic terms.

In trying to achieve the Sustainable Development Goals (SDGs) that was put forward after the deadline of the Millennium Development Goals (MDGs), *life below water; conserve and sustainably use the oceans, seas and marine resources for sustainable development* is in the fourteenth place (UN Economic and Social Council[5], 2016). This draws on different multitudes and because this is a very complex and not so easy task, the goal is further broken down into targets and indicators to constantly keep track, measure what has been achieved and what more is needed to be done (UN Economic and Social Council, 2016). Even before both the MDGs and the SDGs were formed, the United Nations Convention on the Law of the Sea (UNCLOS) had already existed. With the SDGs currently in action, the UNCLOS can be used as a source of reference or guidance into achieving the sustainable usage of the seas, oceans, and marine resources for development.

For this reason, Table 6 is introduced with articles from the United Nations Convention on the Law of the Sea, which are then used as a benchmark to compare the regulations and/or acts in Samoa and Tonga.

[4] *http://www.un.org/depts/los/convention_agreements/texts/unclos/unclos_e.pdf* (accessed 12.05.2017)
[5] *https://sustainabledevelopment.un.org/sdg14* (accessed 07.06.2017)

Table 6 – Mapping Fisheries Policies and Regulation in Tonga

United Nations Convention on the Law of the Sea	Tonga		Samoa	
Article 61 - Conservation of the living resources				
Government determining allowable catch within its exclusive economic zone (EEZ)	1	MZA[6] Part V. 13, 1 (a)	1	EEZA[7]
Scientific information, catch and fishing effort statistics, and other data relevant to the conservation of fish stocks is contributed and exchanged on a regular basis through competent international organizations	0	-	0	-
Article 62 - Utilization of the living resources				
Promote optimum utilization of the living resources in the exclusive economic zone without prejudice to article 61.	1	FMCR[8] Part 2-7	1	LFR Part I & II
Training of personnel & transferring fisheries technology, including enhancement of the coastal State's capability of undertaking fisheries research.	1	FMCR Part V. 35	0	-
Article 118 - Cooperation of States in the conservation and management of living resources				

[6] Maritime Zone Act 2009 *http://www.tongafish.gov.to/images/documents/Legislations/Act/maritimeAct%20No.%2010-2009.pdf* (accessed 29.05.2017)
[7] Exclusive Economic Zone Act *http://www.maf.gov.ws/images/Exclusive%20Economic%20Zone%20%20Act%201977.pdf* (accessed 29.05.2017)
[8] Fisheries Management (Conservation) Regulations 2008 *http://www.tongafish.gov.to/images/documents/Legislations/Regs/Gaz.Supp.No.23-2008.pdf* (accessed 29.05.2017)

United Nations Convention on the Law of the Sea	Tonga		Samoa	
States shall cooperate with each other in the conservation and management of living resources in the areas of the high seas.	1	FMCR Part V	1	LFR[9] Part I
Article 200 - Studies, research programs and exchange of information and data				
Government via cooperation promotes studies, encouraging the exchange of information and data acquired about pollution of the marine environment. They shall endeavor to participate actively in regional and global programs to acquire knowledge for the assessment of the nature and extent of pollution, exposure to it, and its pathways, risks and remedies.	0	-	0	-
Article 244 – Publication & dissemincation of information and knowledge				
States and competent international organizations shall make available by publication and dissemination of information and knowledge available from marine scientific researches.	0	-	1	LFR Part III

[9] Local Fisheries Regulation 1995 *http://www.maf.gov.ws/images/LOCAL%20FISHERIES%20REGULATIONS%201995.pdf* (accessed 29.05.2017)

Promote transferring scientific information and technology both individually and in cooperation with other States and competent international organisation. Also to strengthen research capabilities and training of ones technical and scientific personnels.	0	-	1	
Article 275 Establishment of national centres				
State shall promote the establishment of national marine scientific and technological research centres and strengthen existing ones to stimulate marine studies and enhance its capabilities to utilize and preserve marine resources for the economy's economic benefit.	0	-	0	-
States shall give adequate support to faciliatate the establishment and strengthen its training facilities, the skills and know-how, the necessary equipment as well as technical experts that may be needed.	0	-	0	-
Article 194 – Measures to present, reduce and control pollution of the marine environment				
Government take appropriate measures necessary to prevent, reduce and control pollution of the marine environment from any source.	1	MZA Part VIII. 22. m	1	FMA Part 2. Division 3. 19-22
Necessary measures taken to protect and preserve rare or fragile ecosystems as well as the habitat of depleted, threatened or endangered species and other forms of marine life.	0	-		
Article 197 - Cooperation on a global or regional basis				
Government shall cooperate on a global basis and, as appropriate, on a regional basis, and preservation of the marine environment, taking into account characteristic regional features.	0	-	1	FMA Part 2 (18)
Article 207 - Pollution from land-based sources				
Government taking necessary measure to prevent, reduce and control such pollution by adopting laws and				FMA Part 1

regulations in order to do so.	0	-	1	(4)g. & FMA Part 9 (92)s
Regulations and measures ensure dumping is not carried out without the permission of the competent authorities of States.	0		1	

Notation:1 denotes that the regulation /Act exists, and 0 if otherwise.

Source: United Nations Convention on the Law of the Sea (1994); Tonga's Maritime Zone Act (MZA) (2009) Tonga's Fisheries Management (FM)(Conservation) Regulations (2008), Samoa's Fisheries Management Act (FMA) (2016),

The 9 UNCLOS Articles that have been picked and mentioned in Table 3 can be classified into three main categories and is show below on Table 7.

Table 7: Categorization of UNCLOS Articles

(i) Conservation of marine resources	**(ii) Exchanging technology, information and useful data and utilizing it well**	**(iii) The protection and sustaining of the environment (marine/fishing areas)**
Article 61 Article 62 Article 118	Article 200 Article 244 Article 275	Article 194 Article 197 Article 207

(i) Conservation of marine resources

Conserving marine resources is a problem all over the world. For many years before the emergence of the UNCLOS and even afterwards, the fisheries governance and management practices had mostly followed a sectorial approach, which then led to a common view, that managing fisheries was only about production and development disregarding the broader environmental concerns (Kuemlangan *et al.*, 2014). **Article 61** of the UNCLOS emphasizes the importance of conservation of living resources especially within ones Exclusive Economic Zone (EEZ). The EEZ is a concept that was adopted at the Third United Nations Conference on the Law of the Sea (1982), whereby a coastal State assumes jurisdiction over the exploitation and exploration of marine resources in its adjacent section of the continental shelf with a 200-mile band extension from the shore. The primary fisheries law in Tonga is the Fisheries Act 1989 declaring that all internal waters and territorial seas are the property of the Crown (Royal Family) however in the new Act, this has been reviewed and is no longer a property of the Crown only. Every Tongan person does have the right to fish in these waters and there are no traditional fishing rights given to anyone or exclusivity regarding certain areas to fish (Rohorua, 2004).

Tonga's fishing grounds stretches from 15OS to 23.5OS latitude and 173OW to 17OW

longitude. The expanse of its undeclared EEZ area is approximately 700,000 km^2 in comparison to its land area of 747 km^2. Therefore it is a challenge to effectively manage and maximize sustainable development potentials of all aquatic resources (Ministry of Fisheries, 2017[10]). This happens even though it has been captured in the Maritime Zone Act 2009 (MZA), Part V – *Contiguous Zone and Exclusive Economic Zone*, Number 13 (1.a) which gives Tonga the exclusive economic zone sovereign right to explore and exploit yet at the same time managing and conserving either living or non-living natural resources in its waters, seabed and subsoil (The Maritime Zones Act, 2009)

Tonga's Minister of Fisheries at the FAO's Committee's thirty-second session signed the Port State Measures Agreement (PSMA) in Rome of 2016. This is the world's first international treaty that is particularly aimed at combating illegal, unreported and unregulated fishing through vigorous implementation of government port measures. According to the United Nations, this is a step forward for Tonga in its efforts to conserve fish stocks within its EEZ. Tonga has initiated a monitoring program that reviews its current legislation regarding the issue of robust port measures. The first review was done in the beginning of 2017 however a workshop will be carried out at the end of the year for the Ministry of Fisheries, other government ministries, and also other interested and relevant parties. This is to shed light on the articles of the Agreement and fully understand the obligations that Tonga has towards the Agreement (United Nations, 2017[11]).

According to the United Nation, the PSMA is vital as it establishes an intervention that has foreign fishing vessels comply with the condition of ports within the port state (United Nations, 2017[7]). Considered an important issue for Pacific Island economies as it comes with the vast Ocean that surrounds these islands, Palau and Vanuatu have also signed the agreement. This is mainly a problem for the tuna fisheries as it is a common natural resource shared amongst all Pacific Island Countries (PICs). Although Tonga, Vanuatu and Palau have signed the PSMA, strengthening capacity building activities and continuously monitoring the implementation of the PSMA remains a key focus. This will enable countries to further enforce the PSMA, and fishing vessels will take

[10] http://www.tongafish.gov.to/index.php/about-us (accessed on 09.04.2017)
[11] https://oceanconference.un.org/commitments/?id=21404 (accessed on 09.04.2017)

heed and follow.

Samoa on the other hand, although not signing the agreement has a Fisheries Management Act and in Part 4 – Fishing Activities; "Division 4 – Transhipment and port measures", various issues at the port are being addressed including that of transhipment qualifications of people who work there, the power that port inspectors have and also information that can be disseminated (Samoa's Fisheries Management Act 2016). Not only does Samoa have a transhipment and port measure Act, in its Exclusive Economic Zone Act 1997 (EEZA), Act 15 has 10 general regulations regarding Samoa's EEZ. The legislative Assembly of Samoa states that where there are no provisions, the Head of State with the advice of the Cabinet may form legislations that are consistent with all other regulations, law or agreements that have been put into action or signed between parties (Samoa's Exclusive Economic Zone Act 1977). The purpose of Samoa's EEZA is to establish an EEZ, exercise its sovereign rights in exploring and exploiting, conserving and managing the resources of the zone and for all that is connected towards this. Similarly, the (Samoa) Fisheries Management Act 2016 (FMA) exists to manage and control the management, development and conservation of fisheries, licensing of both local and foreign vessels and everything that relates to this.

As seen, Samoa and Tonga have regulations in place that highly takes interest in governing its waters and consequences are to be dealt with, for those who do not uphold that, which have been mentioned in the FMA, EEZA and the MZA. However the dissemination of scientific information, catch, fishing effort statistics, and other data relevant to the conservation of fish stocks is not contributed and exchanged on a regular basis through competent international organizations and the states as well. This is not done, as there is no regulation that makes this action compulsory or demands of such things.

Drawing on the conservation idea, **Article 62** of the UNCLOS promotes optimum utilization of living resources within the area by the State. This points towards the practical and effective way of living resource usage, which then of course relates to the concept of sustainable fishing and conservation as mentioned in Article 61. The question of optimum utilization is debatable. In Tonga, the government is working hand in hand with communities in special management area (SMA) to lower the fishing

activities taking place. SMAs are areas that have raised a general concern towards the decline in coastal fisheries resources and therefore have been given special attention. The SMA represents one of the well-established, successful and positive developments in the Kingdom. Coastal communities now have the incentive to conserve marine resources, replenishing it over time (Ministry of Agriculture & Food, Forests and Fisheries and Secretariat of the Pacific Community (SPC), 2010) and also protect for the future. This means that outsiders cannot fish what these communities are conserving today (Gillett, 2009).

In addition to establishing these SMAs, the government is also increasing its outreach efforts to educational institutions to promote sustainable fishing. A vital thing to point out is the importance of educating the people of Tonga to understand that marine resources in Tonga are limited in comparison to the increasing population and rise in the demand, mainly in commercial fisheries (Ministry of Fisheries, 2015). In addition to this, Part 5, 35 Tonga's FMCR is titled Trained Employees. It requires employees of fishing license holder to be sufficiently trained in using best practices to harvest fish. The article also acknowledges that if the country is not able to utilize the living resources in the Ocean at the optimum level, other fishing vessels from foreign countries may fish however obeying the regulations and law of the local government regarding fishing within those grounds (United Nations Convention of the law of the Sea (UNCLOS), 1982). However, although this is allowed, the government on the other hand may promote community projects whereby there are subsidies or assistance that may be given to fishermen to be able to optimally fish from the designated areas through petrol funds or appropriate fishing gears. Of course at points in time, the government cannot do all this and this is when the appropriate decision-making is to be done regarding financial or non-financial aid that is given to the government to direct in the path of the Fisheries sector.

Tonga has experienced a decrease in the coastal fish population. In the past decade, it has fallen by up to fifty percent and therefore needs immediate remedial action. Fishermen were able to fish along the coast in the past however nowadays, they go beyond the reef and this is dangerous for fishermen but most importantly, also costly for most (Government of Tonga, 2015). The government responds by establishing the

SMAs mentioned before in places where community based conservation measures are at play. The long-term goal would be for the whole country to be covered in the near future.

Samoa on the other hand clearly states in its Local Fisheries Regulation Part I – Conservation measures and Part 2 – Fish Aggregating Devices, that there is a prohibition of fishing or selling of certain types of fish in a particular point in time. In addition to this, private Fishing Aggregate Devices (FAD) are not to be used unless one is granted permission from the Director of the Ministry of Agriculture and Fisheries (LFR 1995, P I & II). A FAD is any permanent, temporary or semi-permanent structure that is made to lure in fish. It has been noticed that the use of FADs at most times alter the exploitation of the resources with more juvenile stocks of fish were being taken when fishing around the FADs (Food and Agricultural Organization [12], 2017). Therefore, Samoa's Ministry of Agriculture and Fisheries have put this forward: only with the approval is one allowed to set up a FAD and if one is public, fishermen are only allowed to fish only with a radius of two nautical miles.

Moreover, in order to conserve and manage living resources of high sea areas, government states shall cooperate with each other. **Article 118** of the UNCLOS reiterates the need for this cooperation between States in the act of conserving and managing living resources (UNCLOS, 1982). Tonga's FMCR Part V focuses on ways in which species conservation and management can be carried out. These regulations prohibit the fishing of some fish species, the importance of getting a license to fish, particular waters where to fish and the tools that are used to catch fish. Samoa has the same regulations in place in its LFR Part I which are conservation measures as well.

(ii) Exchanging technology, information and useful data and utilizing it well

Managing and conservation of fisheries is a key point in sustainability however, transference of scientific knowledge and acquiring technology also plays a crucial role towards the betterment of the fisheries sector (UNCLOS, 1982). **Article 200** of the UNCLOS gives attention to research programs, studies and the exchange of information

[12] http://www.fao.org/fishery/equipment/fad/en (accessed on 12.07.2017)

as a way forward. The Article requires states to cooperate individually or via international organization for the purpose of promoting studies and exchanging information and data. As seen on Table 6, both Tonga and Samoa do not have specific acts or regulations that make it mandatory for these actions to be taken seriously. In spite of such regulation not existing, the Fisheries Growth Committee (FGC) in the Tonga Fisheries Sector Plan 2016-2024 reports that there needs to be an improvement in the quality of the fisheries data and applied research on fisheries product in order to move forward (Government of Tonga, 2016). With that said, international organisations such as the Japan Trust Fund, Secretariat for Pacific Community (SPC) and FFA (Forum Fisheries Agency) have come together to assist the Tongan government in its quest to improve the quality of data collection and stock assessment. Not only do these projects assist in such matters but it also creates employment in the area.

Additionally for Samoa, there is no such regulation or act that specifically has this matter down but there are some policies and work that is carried out to collect information and data and to educate people to have them cooperate on certain levels. In Samoa's latest Fisheries Newsletter, the Fisheries Division (FD) with the help from SPC and the Australian Centre for International Agricultural Research were able to to conduct a first national consultation with tilapia farmers. A project was therefore introduced and discussions were carried out to see where the farmers are affected at and the key constraint areas. In addition to this, the FD actively participated in the regional fisheries surveillance operation in which they collaborated with a few other (international) organisations such as the Australia Defence Force (ADF), the Police Maritime Wing, and also maritime and fisheries officials from Tonga and the Cook Islands (Fisheries Division[13], 2015). These efforts count for something as both island States try to actively participate and find ways to move forward with regards to the exchange of information and data, promoting studies and facilitating research programs. However, the downside to it, is where the priority of government funds lie (FAO[14],

[13] http://www.maf.gov.ws/images/FISHERIES/July-Sep,%202015-2016,%20First%20Edition.pdf (accessed on 14.08.2017)

[14] http://www.fao.org/docrep/014/i2092e/i2092e00.pdf (accessed on 25.06.2017)

2011). Despite the importance of data and the requirement to do a timely collection of it plus a thorough analysis of its economic side to discover its true impact in the fishery industry as a whole (Government of Tonga, 2016) , it depends where the government allocates its funding and this is a a drawback itself (FAO, 2011).

Moreover, data, recommendation/results of research programs and studies that are gathered in the above process can only be brought to light if this information is disemminated to parties who may find usage for it and and this can be made available via publications through the appropriate channels mentioned in **Article 244** of the UNCLOS. For instance, recommendation from studies in the past have suggested that external fundings be used to improve already existing fisheries and that more advanced technology is planted in outer islands to make fishing more accesible (Kronen and Malimali, 2009; World Bank, 1996). However, the problem is when these recommendations are given to people in power or made known to those who can influence policies, it is overlooked or not even considered at all (Kronen and Malimali, 2009).

In addition, at times when funds are readily available for the Ministry of Fisheries to work with whether it be from the World Development Bank or some other donor, it often goes straight to new fisheries. Instead of it being seen as a panacea to reduce the pressure on exploited or over exploited coastal resources, (public) funding should however be directed to improve the management of current existing fisheries. It should only be going towards new fisheries if its economic viability has been proven (World Bank, 1996). For example, in the community of Lofanga, Haapai in Tonga, what remains as an important factor that hinders the progress in fisheries catch is that the fishermen do not have access to national rural electrification. This means that without the readily availability of electricity supply, it is a challenge to ensure that the fish is properly stored and transported to the mainland markets (Kronen and Malimali, 2009).

Furthermore, due to the the lack of data and statistics which is key to effective evidence based policy making, the World Bank (2016) suggests and is raising a trust fund to finance data gathering, statistics and capacity building for the Carribean and the Pacific which includes Tonga and Samoa. Therefore, althought Samoa also does not have such regulation, other international and global organisations are helping hand in hand to

make this happen.

Article 275 of the UNCLOS stresses the establishment of national centres in coastal states and strengthening existing ones. As seen on Table 6, this does not exist in the fisheries regulations and acts of both States. Due to its geographical characteristics, it is a challenge for both islands to keep track of statistics and data on fishing. The offshore statistics are relatively good however, those of the coastal is mostly based on guesswork (World Bank, 2016). There are no current regulation implementation that governs or is strict in establishing such centres at various points in the islands. However, the establishment of one can enable the State to enhance its national capabilities and to utilize all information that can be gathered from different centres for better policy formation, in different locations of the islands (UNCLOS, 1982).

(iii) The protection and sustaining of the environment (marine/fishing areas)

The last category of the Articles mentioned focuses on protecting and sustaining the marine and fishing areas. Once again echoing that which has been mentioned in Article 61 and 145 of the UNCLOS, **Article 194** is concerned on the importance for the State to design certain measures that can be taken individually or collectively in consistence with the Convention to lessen, control and prevent polluting the marine environment from any source and using for this sole purpose, the best means in the most practical way at their disposal and according to their capabilities, the State shall carry out to harmonize their policies in this way and connection (UNCLOS, 1982). To enforce regulation, fines or other stimulators can be implemented to nudge the population to act accordingly in a manner that will protect the marine environment, hence also the marine life (UNDP, 2017).

To achieve this, both Samoa and Tonga has an institution, the Ministry of Fisheries that overlooks and ensures that the laws and regulations governing its seas are followed to its very best. It is in the mission of Tonga's Ministry of Fisheries to develop its living aquatic resources to its highest level of use and remain harmonious with the ecological sustainability with structures of technology, participation and ownership to maximize the benefits for its people (Ministry of Fisheries, 2017). However at the same time, the tasks are not easy to execute as on paper. Given the lack of resources, the Ministry

cannot effectively execute its duties and obligations both locally and also at the national level (Government of Tonga, 2016).

According to **Article 197** of the UNCLOS, global and regional cooperation between countries ensures the conservation of marine life and fishery resources. It expresses the need for different States to cooperate on these levels in planning and developing standards and rules, which is consistent with the UNCLOS with the purpose of protecting and preserving the marine environment. While Tonga does not have a regulation to enforce this, Samoa in its FMA Part 2 has this, the International conservation and management measures in international agreements. This holds Samoa accountable to imposing what has been agreed upon in international treaties and agreements regarding its global and regional cooperation between itself and other countries (FMA, 2016)

Article 207 of the UNCLOS emphasizes the need to regulate pollution from land-based resources. Since most Tongans depend on the sea and land for daily consumption of food, the environment should be of high priority hence incorporating the environmental dimension of policy into development planning. It has clearly been a problem in the past when people have been caught dumping waste from cliffs into the Ocean or consciously throwing their rubbish into the sea. Various methods were used to educate people on this however have not been enforced and so the public continue to carry out these acts which in turn damages the environment hence also the marine life in the sea. However, on the other hand, Samoa has this enforced in its FMA; the principles of conservation and management measures are to be taken in various pollution scenarios.

Chapter 5. Conclusions

For the coastal people in Tonga, fishing is still part of a way of life. The subsistence and small-scale commercial fishery and its associated marketing are abit advanced. It aims to satisfy individual family needs, cultural and social obligations and also to assist in the transitioning from a system based on exchange on reciprocity and a direct support system to a cash based economy. While an economic instruments may be useful in trying to provide a solution for other income sources or ways in which more can be gained from these small commercial fisheries, it may lack the ability to assign value to the traditional and societal values attached to fisheries in Tonga.

However, based on the discussion and results obtained, Tonga's fisheries acts and regulation need to be overall enforced and new policies should be implemented such as the set up of centers in various towns so that this can act as a hub to pack fish for export. In addition, data collection can be done here and therefore and up to date collection can be kept. In addition to this, a careful consideration should be given to the conservation of fish and fisheries plus the contribution of Tonga globally to fisheries and its management.

By doing this; improving the regulations and implementing policies, which are not in place, there is a forward movement and smaller commercial fisheries can find a way to thrive even when there are hardships in the way and in return, the fisherman can gain more economically.

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Appendices